JED T440 Simple Projector Controller users manual version V021 part B

(Ed Schoell rev: Nov 17th 2008)

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Acer (Code 70 hex), PD727, P1165, P1265, P5260, P5270, P5280, P5370

Channel codes are:

```
Computer1   := '* 0 IR 015' + 0D;   // RGB analog-RGB VGA
Computer2   := '* 0 IR 028' + 0D;   // RGB analog- via DVI (some models only)
Computer3   := '* 0 IR 016' + 0D;   // DVI digital via DVI

Video1      := '* 0 IR 019' + 0D;   // Comp Video
Video2      := '* 0 IR 018' + 0D;   // S-Video
Video3      := '* 0 IR 017' + 0D;   // Component YPbPr via DB15 HDTV
Video4      := '* 0 IR 029' + 0D;   // Component YPbPr DVI or HDMI via adaptor (some models only)
Video5      := '* 0 IR 016' + 0D;   // DVI or HDMI via adaptor
```

(There may be more codes available for “Wireless” and “HDMI” on newer devices. Update later.)

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the “Computer” channel and Video1 as the “Video” channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- Power on projector connection blink codes available;
- OPT7 handshake mode not available;
- Source lock must be turned ON in the “Maintenance” menu;
- Freeze and mute are toggle mode only in these projectors, so 2-yellow-button mute mode is NOT supported;
- Audio functions are limited to one (sometimes two) audio input(s) and no output to room speakers. Use a T461 if audio control is needed.

RS232 connections to 3-Pin DIN Acer projectors.

Mini-DIN 3 socket on projector. Coms at: 9600 DP8N1

Function/Direction	**T440 “projector” Connection**	**Acer Serial Port Connector**
Ground	Ground	Mini-DIN 3 pin 3 (Gnd)
Data from T440 to projector	Tx	Mini-DIN 3 pin 1 or 2 (RXD)
Reply data from projector to T440	Rx	Mini-DIN 3 pin 2 or 1 (TXD)

Mini-DIN 3
solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

BenQ MP510, MP610, MP611, MP620, MP720P, MP721 (Code 38 hex), BenQ MP622 (Code 39 hex), BenQ MP770 (Code 3A hex)

Channel codes for all except MP770 are:

```
Computer1   := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 00 + 60;   // Analog RGB DB15
Computer2   := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 01 + 61;   // DVI (Analog RGB) (some only)

Video1      := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 04 + 64;   // Composite Video RCA
Video2      := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 05 + 65;   // S-Video
Video3      := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 03 + 63;   // Component YPbPr via DB15
```

Channel codes for MP770 are:

```
Computer1   := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 00 + 60;   // Analog RGB DB15
Computer2   := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 02 + 62;   // DVI (Analog RGB)

Video1      := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 05 + 65;   // Composite Video (RCA)
Video2      := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 06 + 66;   // S-Video
Video3      := 06 + 14 + 00 + 04 + 00 + 34 + 13 + 01 + 01 + 61;   // Component YPbPr via DB15
```

MP722, MP723, MP771, SP870 (Code 3D hex)

Channel codes for these are:

```
Computer1   := 0D + '*sour=rgb#' + 0D;      // Analog RGB DB15
Computer2   := 0D + '*sour=dvia#' + 0D;     // DVI-A (Analog) some only

Video1      := 0D + '*sour=vid#' + 0D;      // Composite Video RCA
Video2      := 0D + '*sour=svid#' + 0D;     // S-Video
Video3      := 0D + '*sour=dvid#' + 0D;     // DVI-D (Digital)
```

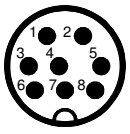
Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- OPT7 handshake mode and power on panel connection blink codes available (not MP722/MP723/MP771/SP870);
- Source scan must be turned off using normal on-screen menu options;
- RS232 communications must be enabled and baud rate set to 19200 in the secret factory setup menu. We have been requested by BenQ not to include these instructions in a general manual like this: Please contact JED at: jed@jedmicro.com.au for details.
- Freeze and mute are toggle mode only in these projectors, so 2-yellow-button mute mode is NOT supported (is in MP722/MP723/MP771/SP870 as this has mute state read-back. Set T461 audio and OPT7 to use this);
- Audio functions are limited to one audio input and no output. Use a T461 if audio control is needed.

BenQ projectors: RS232 Connection

(Communications runs at 19200 8N1. Projectors use a male 8-pin mini-DIN on the cable

Function	T440 "projector" Connection	DIN 8-pin BenQ,
Ground	Pin 1	Pin 4
Serial TX out to projector	Pin 2	Pin 1
Serial RX into T440 from proj.	Pin 3	Pin 7
CTS out to projector	Pin 4	Not used



Mini-DIN 8
solder side

Even though some BenQ manuals show a D sub 9 connector, the tested projectors all have mini-DIN 8-pin sockets. After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Note: MP722/MP723/MP771/SP870: These projectors have a nasty hang-up habit, where coms just stops and only recovery is a 240v power cycle (i.e. at the power point or by pulling the power plug. Until BenQ fix this, DO NOT INSTALL IT POWERED FROM A CEILING POWER POINT. Instruct the user on how to "power cycle" the projector if it stops communicating.

BenQ SP820, Optoma Group 3: EP771, EP772, EP774 projectors (Code 3B hex)

(Message formats are ASCII with format: "~PN<CR>" for Power On, "~SR<CR>" for RGB select, etc.)

Channel codes are:

```
Computer1 :=    '~SR' + 0D;     // RGB analog-RGB VGA
Computer2 :=    '~SD' + 0D;     // DVI

Video1  :=      '~SV' + 0D;     // Comp Video
Video2  :=      '~SS' + 0D;     // S-Video
Video3  :=      '~SY' + 0D;     // Component via DB15
```

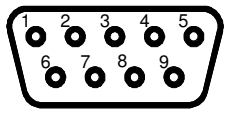
Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- OPT7 handshake mode and power on panel connection blink codes available;
- You must turn off "Auto Source" in "Config" menu;
- You must turn off "Auto Power Off" and 'Direct Power On" in "Config" menu.
- Freeze and mute toggle only with the "Freeze/Mute" keyboard. No LEDs flash in the "Mute" state. No 2-yellow-button mute is provided with a "Volume" keyboard as the limited projector codes cannot command absolutely or read back the mute state;

RS232 connections to BenQ SP820, Optoma EP771/772 projector with D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, 1 stop.

Function/Direction	**T440 "projector" Connection**	**"Serial" Port Connector**
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 3 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 4 (TXD)
Plus 9 volt CTS/DTR to projector	n/c	n/c



D-sub 9 female solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Epson VP21 projectors (Code 0C hex)

This family has many members with a range of channel messages.

Typical models are: EMP 30/52/53/54/61/73/74/81/62/82/83/400W/600/800/810/811/820/821/822/828/830/835/830 / EMP 6100/6000/6110/1810/1815/1825/7800/7850/7900/7950/8300/9300/S1/S1H

In the back of each user's manual is a list of typical channel selection messages,

Channel codes are:

```
Computer1    := 'SOURCE 11' + 0D;    // DSUB1 VGA analog-RGB
Computer2    := 'SOURCE 21' + 0D;    // DSUB2 VGA analog-RGB
Computer3    := 'SOURCE 30' + 0D;    // INPUT3 DVI-D
Computer4    := 'SOURCE 31' + 0D;    // INPUT3 D-RGB
Computer5    := 'SOURCE B1' + 0D;    // INPUT4 BNC analog-RGB

Video1       := 'SOURCE 41' + 0D;    // Comp Video
Video2       := 'SOURCE 42' + 0D;    // S-Video
Video3       := 'SOURCE 14' + 0D;    // Component on DSUB1 or YCbCr on DSUB1
Video4       := 'SOURCE 24' + 0D;    // Component on DSUB2 or YCbCr on DSUB2
Video5       := 'SOURCE 15' + 0D;    // YCbCr on DSUB1
Video6       := 'SOURCE 25' + 0D;    // YCbCr on DSUB2
Video7       := 'SOURCE 30' + 0D;    // INPUT3 DVI-D
Video8       := 'SOURCE 31' + 0D;    // INPUT3 D-RGB
Video9       := 'SOURCE B2' + 0D;    // INPUT4 BNC COMPONENT RGB-Video
Video10      := 'SOURCE B3' + 0D;    // INPUT4 BNC COMPONENT YCbCr
Video11      := 'SOURCE B4' + 0D;    // INPUT4 BNC COMPONENT YPbPr
Video12      := 'SOURCE C4' + 0D;    // INPUT5 BNC COMPONENT YCbCr
Video13      := 'SOURCE C5' + 0D;    // INPUT5 BNC COMPONENT YPbPr
```

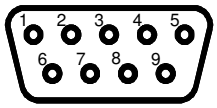
Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- OPT7 handshake mode and power on panel connection blink codes available.

RS232 connections to Epson ESC-VP21 projectors

These use a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T440 "projector" Connection**	**Epson ESC-VP21 "Control" Port Connector**
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C



D-sub 9 female solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Epson X5, X5E (etc) IR controlled projectors (Code A0 hex)

This family uses InfraRed communications with the projector via a stick-on "bug" IR transmitter placed over the IR window on the back of the projector. It simulates the IR codes sent by the hand-held remote control, and unfortunately the functions are limited by the projector's lack of absolute command codes in the IR sequences. Thus there are no absolute commands for "Video", "Computer 1", etc: rather the keyboard (Code 1) has a green button marked "Source / On" which sends the "Power" command to the projector once, but does not send a "Set Source" command automatically after warm-up. The red LED comes on immediately on power up with no flashes, and the green LED flashes during warmup and glows continuously in the ON state. Pressing the OFF button sends the "POWER" IR message twice and the red LED blinks during the cool-down time, then glows steadily.

The projector will start on the same source channel it was displaying when switched OFF. Pressing the "Source / On" button again (after warm-up) will index the projector through available sources, but it will only stop on a source if a valid input **is being fed into that input when the projector is looking at that channel.** If there is no input at that point, it will not change to it, but just put up a message screen. If a valid signal is then applied, the "Source / On" button will need to be pressed again to get it to lock onto the new source.

Models which run with this set of IR commands and IR modulation frequency of 38Khz are: EMP 740/745/737/732, EMP765/760/755/750/X3/ S3/S4. This family of projectors all use Device-code 8355h and use "NEC" format.

User's manuals are at: http://tech.epson.com.au/downloads/index.asp?select=7&sCategory=

A new keyboard layout has been designed for this IR mode operation, designated "Code 1". It provides incremental volume Up/Down keys, and the current volume level is shown on the projected image for a few seconds. The red and green LEDs follow the current state of the projector, but if the projector gets out of step with the controller (eg by the projector being ON when the red OFF led is showing), pressing the OFF button once (in the projector OFF state) will send the "POWER" IR message twice (with a 1-second separation) which will get things back into step (both OFF).

Because there is no feedback serial path to the controller, OPT7 status read-back is not possible.

There is only one audio input for this projector. Operation with the T461 audio mixer (OPT7) is NOT possible, as there is no way the controller knows which video source is in use, to command the T461 audio source switching to follow video source.

(Freeze and mute are not supported at this stage. Two-button-mute mode is not supported either.)

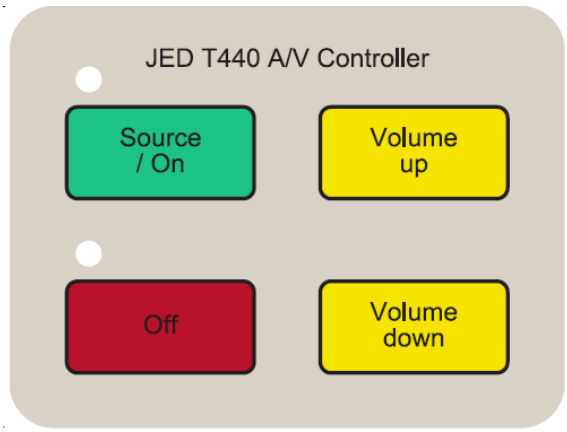
Wiring

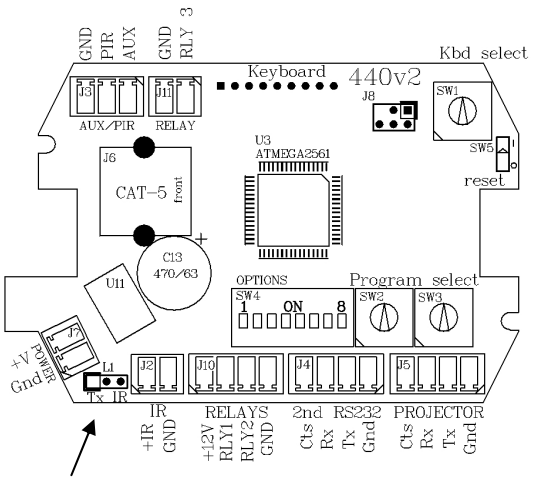
The IR transmitting bug is wired to the IR output socket J2 with the shield of the cable connected to the ground pin and the centre conductor to the "+IR" pin. The signal is current limited (24mA pulses), so no series resistors are needed in the cable.

As the IR bug wire is only 2M long it will usually be extended, and CAT5 cable is OK for this, but it must be via its own twisted pair (colour plus colour-with-white). (We have successfully tested this with 50M of CAT5E cable.)

If the CAT5 connector and cable is used runs from CAT5 connector J6, the IR signal runs via a twisted pair of wires via this cable, but link L1 must be moved from Tx (it's position in RS232 mode) to IR (as needed for IR mode).

Code 1 keyboard:





HP vp6320/6321/6325, xp8010/8020 (code 48 hex), ep7120/7122 (Code 49 hex)

Manuals available on line:

HP vp6300 manual: http://www.projectorcentral.com/pdf/projector_manual_2885.pdf

HP ep7120/7122 manual:
http://h10025.www1.hp.com/ewfrf/wc/document?lc=en&cc=us&docname=c00216274&product=427168&dlc=en&printable=yes&encodeUrl=true&

HP xp8010 manual: http://h10032.www1.hp.com/ctg/Manual/bpq04040.pdf

Channel codes are:

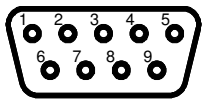
```
Computer1   := '*RSRC=1' + 0D;    // VGA1 Analog RGB DB15 vp632x, xp802x, Code 48
Computer2   := '*RSRC=2' + 0D;    // VGA2 Analog RGB DB15 on xp8010/20, Code 48
Computer3   := '*RSRC=6' + 0D;    // RGBHV  xp8010/20, Code 48
Computer4   := '*RSRC=7' + 0D;    // M1 Graphics (DVI) xp8010/20, Code 48
Computer5   := '*RSRC=8' + 0D;    // DVI  vp63xx, not analog, Code 48

Computer1   := '*RSRC=8' + 0D;    // VGA1 Analog RGB via DVI to DB15 adaptor (ep712x, Code 49)

Video1   := '*RSRC=3' + 0D;       // Composite Video RCA all
Video2   := '*RSRC=4' + 0D;       // S-Video all
Video3   := '*RSRC=5' + 0D;       // Component Video YPbPr xp632x/xp8010/20
Video4   := '*RSRC=6' + 0D;       // RGBHV  xp8010/20, Code 48
Video5   := '*RSRC=7' + 0D;       // M1 Graphics (DVI) xp8010/20, Code 48
Video6   := '*RSRC=8' + 0D;       // DVI  vp63xx, not analog, Code 48
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default).

- Setting OPT2 switch ON will send an Auto Pixel Align message 30 seconds after selecting a computer channel;
- Pressing a "Computer" channel key when already selected will instead send a Auto Pixel Align whenever needed;
- For ep712x use Code 49 on the Sw2/3, and use DVI-> VGA connector. (No computer 2.)
- OPT7 handshake mode and power on panel connection blink codes available.

RS232 connections to Hewlett-Packard vp63xx, xp80xx, (probably also ep712x)

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

Function/Direction	T440 "projector" Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)	
Plus 9 volt CTS/DTR to projector	N/c		

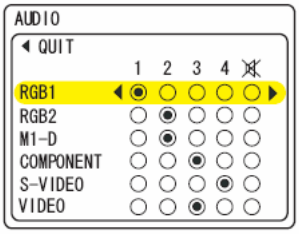
After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Hitachi projectors (Code 44 hex, single audio control, Code 45, “by channel” audio)

This family has a compact set of “BE EF” hex commands consistent across the models. Two code groups are provided:

Code 44 is used when there is an audio in for typically each RGB channel but one audio shared by all video inputs. There is only one pair of commands for audio Inc/Dec and the level of all channels is controlled by this one pair of commands. So if a level has been dropped for a RGB channel, the audio level is down for the Video input and needs to be manually adjusted up. These are typically many older models (excluding 3-byte code: CP-X935 to X970.)

Also supported by code 44 are: 3M-MP8746/MP8747/MP8775, 3M-X45, 3M-X55, 3M-X75, 3M-X70, 3M-X80, ELMO EDP-S10, VIEWSONIC PJ510/PJ853/PJ656/PJ552/PJ562/PJ750/PJ862/PJ1165/PJ1172/PJ1065, also InfocusLP800 (Hitachi PJ-TX10 does have Code 44 audio.)



Code 45 is used when there are a number of audio inputs (2, 3 or 4) but these are unallocated to a video channel. **These must be manually allocated using the projector menu system to suit the audio sources, cables and connectors on site, but any audio input can typically be allocated to any video/RGB input.** Audio channels can be shared or a channel set to have no audio. A typical menu sequence is to go to: Menu -> Advanced menu -> Audio -> Audio, which gives a table of (a variable number of) channel names down the left column, audio inputs by number across the top, and a matrix of buttons which allows one allocation button or an OFF button to be selected per channel. Use the “down” button to select a channel, and the “left” or “right” buttons to move the “dot” to select that channel’s audio. Move to the “quit” position to save and use the “left” to exit the menu.

Typical Code 45 models are: CP-X2, CP-X6, CP-X200, CP-X205, CP-X251, CP-X253, CP-X245, CP-X255, CP-X256, CP-X260, CP-X265, CP-X268, CP-X300, , CP-X305, CP-X308, CP-X400, CP-X417, CP-X505, CP-X600, CP-X605, CP-X608, ED-X10, ED-X12, ED-X15, ED-X22
VIEWSONIC PJ759/PJ758/PJ760, PJ1158, 3M-X64, 3M-X90
Following have no audio so can use either code: PJ-TX100, TX200, TX300

In the back of each user’s manual is a list of typical channel selection messages, and manuals of most Hitachi projectors are available at: http://www.projectorcentral.com/Hitachi.htm or http://www.hitachi.com/products/personal/av.html

Channel codes are:

```
Computer1   := BE + EF + 03 + 06 + 00 + FE + D2 + 01 + 00 + 00 + 20 + 00 + 00;   // Analog RGB 1 DB15
Computer2   := BE + EF + 03 + 06 + 00 + 3E + D0 + 01 + 00 + 00 + 20 + 04 + 00;   // Analog RGB 2 DB15/ BNC
Computer3   := BE + EF + 03 + 06 + 00 + 0E + D2 + 01 + 00 + 00 + 20 + 03 + 00;   // Digital/M1D/DVI/HDMI

Video1      := BE + EF + 03 + 06 + 00 + 6E + D3 + 01 + 00 + 00 + 20 + 01 + 00;   // Composite Video RCA
Video2      := BE + EF + 03 + 06 + 00 + 9E + D3 + 01 + 00 + 00 + 20 + 02 + 00;   // S-Video
Video3      := BE + EF + 03 + 06 + 00 + AE + D1 + 01 + 00 + 00 + 20 + 05 + 00;   // Component RCA
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the “Computer” channel and Video1 as the “Video” channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- OPT7 handshake mode and power on panel connection blink codes available.

RS232 connections to Hitachi and 3M, InFocus and Elmo Hitachi-made projectors

These use either a D-sub 15 shrink jack pin connector, female on cable, or a DB9, female on cable. Coms at 19200 8N1:

Function/ Direction	**T440 “projector” Connection**	**Hitachi “Control” Port Connector 15-pin shrink**	**Hitachi “Control” Port Connector, DB9** (some)
Ground	Ground	Pin 6, 7 and 10. (Use all)	Pin 5
Data from T440 to projector	Tx	Pin 13	Pin 2
Reply data from proj. to T440	Rx	Pin 14	Pin 3
Plus 9 volt CTS/DTR	N/C	N/C	N/C

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. CTS is NOT needed.

InFocus projectors (Code 58 hex) (also ASK/Proxima A1100/A1200/A1300)

Currently only **IN2102/EP, IN2104/EP and IN2106/EP**, but possibly will drive other similar units.

In the back of each user's manual is a list of typical channel selection messages, and manuals of InFocus projectors are available at: http://www.infocus.com/support.aspx , enter projector model number into the "Projector QuickFind" window to get to an individual model's page, and click the "documents" tab for codes.

Channel codes are:

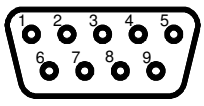
```
Computer1     := '(SRC0)';     // DSUB1 VGA analog-RGB
Computer2     := '(SRC1)';     // DSUB2 VGA analog-RGB

Video1        := '(SRC2)';     // Comp Video
Video2        := '(SRC3)';     // S-Video
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- The current projectors supplied in Australia **MUST HAVE A SOFTWARE UPGRADE BEFORE INSTALLATION from 1.01 to 1.07 or later**, otherwise operation is unreliable (comms hangs up) and handshake response requests are incorrectly interpreted as a "power down" command, due to a firmware bug in the projector;
- On panel connection blink codes and OPT7 handshake mode are available;
- Freeze command is available, so "Code A" keyboard OK;
- Two-yellow button "Mute" command is supported;
- The projector is set to Auto Source = 0 (Off) automatically from the T440 by a command string; and
- There is about a 10 second delay after pressing OFF before the lamp goes out and "Cooldown" starts.

RS232 connections to InFocus only IN2102/EP, IN2104/EP and IN2106/EP with D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 115,200 baud, 8 bits, no parity, 1 stop.

Function/Direction	T440 "projector" Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)	
Plus 9 volt CTS/DTR to projector	n/c	n/c	

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

LG LCD/Plasma display/TV (Code 18, 19, 1A and 1B hex)

In the back of each "Owner's manual" is a list of "input select" codes … examine this table to determine the family.

There are over a 100 different displays in the "kb" LG family, and **codes 18 and 19** cover the "kb" codes group (see the manuals). There are several allocations used, but all use numbers in the 6 … 9 range for RGB analog computer, so all these are drivable by the code, some may need manual (i.e. at setup time) allocation to constants 0 … 3. AV1/2 code can vary too, but usually in the 0 … 5 range. Devices are, LCD TV 32/37/42/47/52 LB9/LC7/LC2, and plasma TV 42/50/60 PB2/4/PC5/PY3. **Choice of codes 18 or 19 determines TV type, Analog or Digital**.

The newer "xb" family, with **codes 1A and 1B**, cover the LG3, LG5, LG6 and LG7 family and use a single hex byte after the ASCII select string, with the top 4 bits (5x, 9x, 2x, 4x) selecting an input type (AV, Component, etc) and the low 4 bits the input number (x0 or x1). **Choice of codes 1A or 1B determines TV type, Analog or Digital.**

(Another, older, group uses an "i" as a leading character; these are NOT drivable with the Code 18/19/1A/1B driver.)

Function code	"kb" strings, code 18, 19 hex	"xb" strings, code 1A, 1B hex	Comments
Computer1	'kb 00 6' + 0D	'xb 00 ' + 50 + 0D	Select RGB-PC (sometimes RGB-DTV on older)
Computer2	'kb 00 7' + 0D	'xb 00 ' + 90 + 0D	Select HDMI-1 (sometimes RGB-PC on older)
Video1	'kb 00 2' + 0D	'xb 00 ' + 20 + 0D	AV1 Video/S-Video
Video2	'kb 00 3' + 0D	'xb 00 ' + 21 + 0D	AV2 Video/S-Video (some only)
Video3	'kb 00 4' + 0D	'xb 00 ' + 40 + 0D	Component 1 Video YPbPr
Video4	'kb 00 5' + 0D	'xb 00 ' + 41 + 0D	Component 2 Video YPbPr
Video5	'kb 00 7' + 0D	'xb 00 ' + 90 + 0D	Select HDMI-1 (sometimes RGB-PC on older)
Video6	'kb 00 8' + 0D	'xb 00 ' + 91 + 0D	Select HDMI-2 (sometimes HDMI-1 or DVI on older)

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels.)

```
TV := 'kb 00 0' + 0D;  or := 'xb 00 ' + 00 + 0D;        // TV Digital (Code 18 or 1A hex selects)
TV := 'kb 00 1' + 0D;  or := 'kb 00 ' + 10 + 0D;        // TV Analog (Code 19 or 1B hex selects)
```

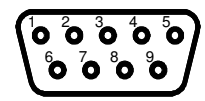
This panel can be used with a number of keyboards:

- With a "Code 9" or "Code B" keyboard, with buttons selecting "Video" and 'Computer", with "Volume Up/Dn";
- With a "Code E" keyboard, with buttons selecting "TV", "Video" and "Computer", with TV channel Up/Down and Volume control keys. (The TV channel commands send incremental (i.e. up and down) commands), so the limits are set in the panel.)
- No OPT7 handshake mode or power on panel connection blink codes available.
- Freeze command is not available.

RS232 connections to LG LCD, LG Plasma and Zenith flat screens

These use a 9-pin-D9 male on the panel, female on cable. Comms is at 9600, 8N1

Function/Direction	T440 "projector" Connection	Panel RS232 Port Connector
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 3 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 2 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C



D-sub 9 female solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.
Some have clamp diodes on signal lines so voltages may be limited to -0.7 volts and plus 5v signal pulses.

Mitsubishi projector families: Codes 24 to 28 hex

In the back of some user manuals is a list of RS232 control messages.
Also, see master RS232 code list at: http://www.mitsubishi-presentations.com/customercare/projector_tools.html (There are some confusions is this site, eg the DX300 link calls up the X300, so to get the XD300/350 sheet use the XD350.)

Volume range settings determine what codes family to select: Audio is done either with an "Absolute" command, "00VL" followed by a decimal 2-digit number, eg "00VL21<CR>", or an increment/decrement command "00r06 <CR>" and "00r07 <CR".

For the absolute volume controlled projectors, there is a paragraph in the manual section or document called "Controlling the projector using a personal computer" called "Volume Commands". Look in there for the volume range, eg **00 – 31** in the box after the VL command definition. Select a control code from the following table:

Volume range	Code group on hex switches	Volume range	Code group on hex switches
00-21	$24	00-60	$26
00-31	$25	00-100	$27

Note: Recently we have found some Mit. Projectors have different audio control ranges than the Mit. manual states. If you cannot get the full range, try a diff. code.

Some model types for code group 24 hex, 00-21 range:

EX10U, ES-EX100U, HC100, S/XD420U, S/XD430U, HC900/E, WD2000, WL639U, XD435U, XD400U, XD450U, XD460U, XD470U, XD480U, XD490U, XD500, XD510U, XD520U, XD2000U, XL6U

Some model types for code group 25 hex, 00-31 range:

FL7000U, S/XL4U, XL5U, SL6U, XL8U, XL9U, S/XL25U, XL30U, X200E, S/XD200U, XD300U, XD350U, X390U, X400U, SX490U, X500U, XL550U, XL650U, XL1550U, XL2550U, XL5900U, XL5950U, XL5980U/LU, InFocus LP1200

Some model types for code group 26 hex, 00-60 range:

S/XL1U, S/XL2U, S/X50U, SA51U, X70/U, X80U

Some model types for code group 27 hex, 00-100 range:

SD105U, S/XD206U:

Some model types for code group 28 hex, no audio or inc/dec audio only range:

If there is no "Volume commands" paragraph (or no audio in the projector), use the incremental control driver selection, code $28.

No audio: HC1100, HC1500, HC3000, HC3100, HC4900, HC5000, HD1000, HD4000

Inc/dec audio: X100E, S/X120E, S/X250U, S290U, X300U

Channel codes are:

```
Computer1 :=    '00_r1' + 0D;    // RGB 1 VGA analog-RGB
Computer2 :=    '00_r2' + 0D;    // RGB 2 VGA analog, sometimes DVI analog
Computer3 :=    '00_d1' + 0D;    // DVI Analog 1
Computer4 :=    '00_d2' + 0D;    // DVI Analog 2

Video1 :=       '00_v1' + 0D;    // Vid composite 1 or S-Video 1
Video2 :=       '00_v2' + 0D;    // Vid composite 2 or S-Video 2
Video3 :=       '00_c1' + 0D;    // Component
Video4 :=       '00_d1' + 0D;    // DVI or HDMI 1
Video5 :=       '00_d2' + 0D     // DVI or HDMI 2
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels.)

- OPT7 handshake mode and power on panel connection blink codes available;

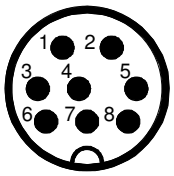
RS232 connections to Mitsubishi projectors (see also D9 following)

These use an 8 or 9-pin mini-DIN male on the cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

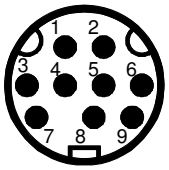
Function/Direction	**T440 "projector" Connection**	**"Serial" Port Connector**
Ground	Ground	8 or 9-pin mini-DIN pin 4
Data from T440 to projector	Tx	8 or 9-pin mini-DIN pin 1 (RXD)
Reply data from projector to T440	Rx	8 or 9-pin mini-DIN pin 7 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C

NOTE: Mitsubishi use either an 8 or a 9-pin connector for RS232 (the 9-pin one has some USB lines, which are ignored in use with the T440). Mitsubishi in some cases supply an off-the-shelf mini-DIN 8 to DB9 and a mini-DIN 9 to DB9 cable called by them the "RS232C" cable.

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.



Mini-DIN 8 solder side

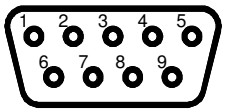


Mini-DIN 9 solder side

RS232 connections to Mitsubishi projectors, D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

Function/Direction	**T440 "projector" Connection**	**"Serial" Port Connector**
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)
Plus 9 volt CTS/DTR to projector	N/c	



D-sub 9 female solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

NEC NLT-40/46FHD100, Sherwood LF-401-TB5 TV/LCD panel (Codes 1C and 1D), (Made by "indtek" in Korea as LC-401EB3 and LC-461EB3, also sold by Grundig.)

There are two drivers for this: these are same for Computer and Video, but the TV function can select Full HD Digital tuner (Code 1C hex) or analog tuner (Code 1D hex)

This family has many members with a range of channel messages.

Channel codes are:

```
Computer1    := 'kb 00 7' + 0D        // Select PC-RGB
Computer2    := 'kb 00 8' + 0D        // Select HDMI-1
Computer3    := 'kb 00 9' + 0D        // Select HDMI-2
Computer4    := 'kb 00 A' + 0D        // Select HDMI-3

Video1       := 'kb 00 2' + 0D;       // AV1 Comp Video
Video2       := 'kb 00 5' + 0D;       // S-Vid
Video3       := 'kb 00 3' + 0D;       // AV2 Comp Video
Video4       := 'kb 00 4' + 0D;       // AV3 Comp Video   (side)
Video5       := 'kb 00 6' + 0D;       // Component
Video6       := 'kb 00 0' + 0D;       // TV Digital
Video7       := 'kb 00 1' + 0D;       // TV Analog
Video8       := 'kb 00 8' + 0D;       // Select HDMI-1
Video9       := 'kb 00 9' + 0D;       // Select HDMI-2
Video10      := 'kb 00 A' + 0D;       // Select HDMI-3
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

```
TV       := 'kb 00 0' + 0D;          // TV Digital (Code 1C hex selects)
TV       := 'kb 00 1' + 0D;          // TV Analog (Code 1D hex selects)
```

This panel can be used with a number of keyboards:

- With a "Code 9" or "Code A" keyboard, with buttons selecting "Video" and 'Computer", with either "Volume" (code 9) or "Freeze/Mute" (Code A);
- With a "Code B-L" or "Code B-P" keyboard, with buttons selecting "Video" and "Computer1" and "Computer2" with Volume control keys; or
- With a "Code E" keyboard, with buttons selecting "TV", "Video" and "Computer", with TV channel Up/Down and Volume control keys. (The channel commands send incremental (i.e. up and down) commands), so the limits are set in the panel.)

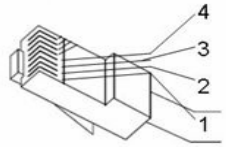
(Keyboards B and E combine channel keys with "On" keys.)

- Panel connection blink codes are available but OPT7 handshake mode in NOT.

RS232 connections to Sherwood TV/LCD panel

These use a RG45 on the LCD, female on cable. Comms is at 9600 baud, 8 bits, no parity, 1 stop.

Function/Direction	**T440 "projector" Connection**	**RG45 Connector EIA568A**
Ground	Ground	Pin 3 (orange-white) & pin 4 (solid blue)
Data from T440 to projector	Tx	Pin 1, green-white
Reply data from projector to T440	Rx	Pin 2, solid green



After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

NEC LCD: 3000/3210/4000/4010/4020/4610/4620/5220/5710/6520P/L, SC40/SC46, NEC LCD: M40/M46 Old T1, Old T2, Multeos (new mode), NEC Plasma: 42XC10/42XP10, 50XC10/50XP10, 60XC10/60XP10

In the back of each user's manual is a list of typical channel selection messages, and manuals of NEC LCD panels are available at http://www.nec-display-solutions.co.uk/c/g/uk/en/Service/Home/index.html

Function code	NEC LCD 00_r/00_v and M40/46 (old codes)	M40/46 Multeos (new codes)	Comments
Computer1	'00_r2' + 0D	'00600001'	Select RGB-PC
Computer2	'00_r3' + 0D	'00600002'	RGB/HV into BNC sockets
Computer3	'00_r1' + 0D	'00600003'	DVI digital
Video1	'00_v1' + 0D	'00600005'	Composite Video (also S-Video on some)
Video2	'00_v3' + 0D	'00600007'	S-Video
Video3	'00_v2' + 0D	'0060000C'	Component 1 Video YPbPr (RCA)
Video4	'00_h1' + 0D	'00600004'	HDMI
TV	n/a	'0060000A'	Digital TV

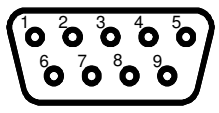
Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- On panel connection blink codes supported;
- OPT7 handshake mode is not available;
- NEC 3000 … 6520, SC40/46 and M40/46 (old codes) ONLY support keyboard codes "0" and "5"
- Audio control (Volume up/down keyboards, codes 2, 9, B, and E) and two-yellow button "Mute" command is ONLY supported in M40/M46 Multeos mode;
- Freeze is not supported at all;
- Turn off ECO mode of the panel to enable On/Off control; and
- TV control (keyboard code 'E') is only available for M40/M46 in Multeos mode. It uses absolute channel settings, so you MUST setup: Constant:A (Lower TV channel setting, "0" assumed if not set to value) and Constant:B (Upper TV channel setting, "10" assumed if not set to value.)

RS232 connections to NEC LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	T440 "projector" Connection	"Serial" Port Connector
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C



D-sub 9 female solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

NEC Plasma PX-42/50/60/61, VM/VP/VR/XM/XR, 2/3/4/5/6 (Code: 14hex)

This family has many members with a range of channel messages.

There is a typical RS232 code Operation Manual at: http://www.prokare.com.tr/pdf2/nec_residental_plasma_rs232.pdf

And http://www.nec-display-solutions.co.uk/c/g/uk/en/Service/Home/index.html

Channel codes are:

```
Computer1  := DF + 80 + 60 + 47 + 01 + 07 + 0E;   // RGB1 / PC1  DB15
Computer2  := DF + 80 + 60 + 47 + 01 + 08 + 0F;   // RGB2 / PC2  5 x BNC
Computer3  := DF + 80 + 60 + 47 + 01 + 0C + 13;   // RGB3 / PC3  DVI-D

Video1     := DF + 80 + 60 + 47 + 01 + 02 + 09;   // "Video2"  RCA Composite Video
Video2     := DF + 80 + 60 + 47 + 01 + 03 + 0A;   // "Video3"  S-VIDEO DIN-4
Video3     := DF + 80 + 60 + 47 + 01 + 01 + 08;   // "Video1"  BNC
Video4     := DF + 80 + 60 + 47 + 01 + 05 + 0C;   // HD1 3 x RCA DTV1/Component
Video5     := DF + 80 + 60 + 47 + 01 + 06 + 0D;   // HD2 5 x BNC DTV2/Component or SCART1/2
Video6     := DF + 80 + 60 + 47 + 01 + 0E + 15;   // HD3 DVI/HDMI  (some only)
Video7     := DF + 80 + 60 + 47 + 01 + 1A + 21;   // HD4 DVD/HDMI  (some only)
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

This panel can be used with a number of keyboards:

- With a "Code 9" keyboard, with buttons selecting "Video" and 'Computer", with "Volume" keys.
- With a "Code B-L" or "Code B-P" keyboard, with buttons selecting "Video" and "Computer1" and "Computer2" with "Volume" control keys. (Keyboards combine channel keys with "On" keys.)
- (There is no point in using a Code A keyboard, as there is no "Freeze" function on plasma screens.

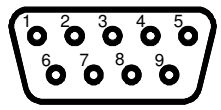
Panel connection blink codes are available but OPT7 handshake mode in NOT.

Audio mute with 2 Vol keys is available, but not video.

RS232 connections to NEC Plasma with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	**T440 "projector" Connection**	**"Serial" Port Connector**
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)
Plus 9 volt CTS/DTR to projector	"RTS"	9-pin D-sub pin 8(CTS IN)



D-sub 9 female solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

NEC projector families: GT60, HT,LT, LT30, NP40, LT60, LT80, MT70, NP1000, NP4000, WT, VT, (38,400 baud, Code 10 hex)
NEC projector families: VT70, VT80, VT90 (19,200 baud, Code 11 hex)
NEC old or at 9,600 baud (eg with long cable runs): Code 12 hex

Note: Check the projector installation guide/user manual and set hex code to match projector speed.

In the back of each "Installation Guide" is a list of typical channel selection messages.
Also, see master NEC code list at: http://www.nec-display-solutions.co.uk/c/g/uk/en/Service/Home/index.html

Channel codes are:

```
Computer1   := 02 + 03 + 00 + 00 + 02 + 01 + 01 + 09;   // RGB 1 VGA analog-RGB
Computer2   := 02 + 03 + 00 + 00 + 02 + 01 + 02 + 0A;   // RGB 2  sometimes DVI analog
Computer3   := 02 + 03 + 00 + 00 + 02 + 01 + 03 + 0B;   // DVI Analog
Computer4   := 02 + 03 + 00 + 00 + 02 + 01 + 1A + 22;   // **DVI Digital   OR component (VT770)
Computer5   := 02 + 03 + 00 + 00 + 02 + 01 + 1F + 27;   // Input Select Viewer
Computer6   := 02 + 03 + 00 + 00 + 02 + 01 + 20 + 28;   // LAN

Video1      := 02 + 03 + 00 + 00 + 02 + 01 + 06 + 0E;   // Comp Video
Video2      := 02 + 03 + 00 + 00 + 02 + 01 + 0B + 13;   // S-Video
Video3      := 02 + 03 + 00 + 00 + 02 + 01 + 07 + 0F;   // Comp Video 2
Video4      := 02 + 03 + 00 + 00 + 02 + 01 + 0C + 14;   // S-Video 2
Video5      := 02 + 03 + 00 + 00 + 02 + 01 + 10 + 18;   // Component #1
Video6      := 02 + 03 + 00 + 00 + 02 + 01 + 11 + 19;   // Component #2
Video7      := 02 + 03 + 00 + 00 + 02 + 01 + 12 + 1A;   // Component #3
Video8      := 02 + 03 + 00 + 00 + 02 + 01 + 1A + 22;   // **DVI Digital   OR component (VT770)
Video9      := 02 + 03 + 00 + 00 + 02 + 01 + 24 + 2C;   // Slot1-1   GT5000/6000
Video10     := 02 + 03 + 00 + 00 + 02 + 01 + 25 + 2D;   // Slot1-2   GT5000/6000
Video11     := 02 + 03 + 00 + 00 + 02 + 01 + 29 + 31;   // Slot2-1   GT5000/6000
Video12     := 02 + 03 + 00 + 00 + 02 + 01 + 2A + 32;   // Slot2-2   GT5000/6000
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

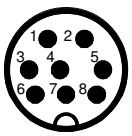
- OPT7 handshake mode and power on panel connection blink codes available.

Models HT410/510, LT180, VT70 series, and NP40 series don't control audio via RS232: use a T461 instead.

RS232 connections to NEC projectors

Most use a male 8-pin mini-DIN. Others, see D9 below.

Function/Direction	T440 "projector" Connection	"Serial" Port Connector
Ground	Ground	8-pin mini-DIN pin 4
Data from T440 to projector	Tx	8-pin mini-DIN pin 1 RXD)
Reply data from projector to T440	Rx	8-pin mini-DIN pin 7 TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C

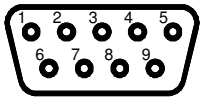


Mini-DIN 8
solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

These use a 9-pin-D9 male on the projector, female on cable.

Function/Direction	T440 "projector" Connection	"Serial" Port Connector
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)
Plus 9 volt CTS/DTR to projector	"RTS"	9-pin D-sub pin 8(CTS IN)



D-sub 9 female
solder side

Optoma Group 1: DS309, DX609, EP721, EP723, EP727, EP728, EP752, EP761, EP763 (Code 0D hex)
Optoma Group 2: EP766, EP782/W (Code 0E hex)

(Optoma Group 3: See BenQ SP820 for EP771/772 projectors (Code 3B hex))

In the back of each "User's Manual" is a list of channel selection messages.
See master Optoma manual/code list at: http://www.optoma.eu/support.aspx

Function code	Group 1	Group 2	Comments	
Computer1	'~0039 5' + 0D	'~0012 5' + 0D	VGA1	
Computer2	'~0039 6' + 0D	'~0012 6' + 0D	VGA2 (some only)	
Computer3	'~0012 2' + 0D		DVI-D (some only)	
Computer4	'~0012 3' + 0D	'~0012 1' + 0D	Group 1: DVI-A	Group 2: HDMI
Computer5		'~0012 11' + 0D		Group 2: Wireless
Video1	'~0039 10' + 0D	'~0012 5' + 0D	Composite Video	
Video2	'~0039 9' + 0D	'~0012 9' + 0D	S-Video	
Video3	'~0012 8'+ 0D		VGA1 Component	
Video4	'~0012 3' + 0D	'~0012 13' + 0D	Group 1: DVI-A (some)	Group 2: VGA2 Component
Video5	'~0012 2' + 0D		DVI-D (some only)	
Video6		'~0012 1' + 0D		Group 2: HDMI
Video7		'~0012 11' + 0D		Group 2: Wireless

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels.)

This panel can be used with a number of keyboards:

- With a "Code 9" or "Code B" keyboard, with buttons selecting "Video" and 'Computer", with "Volume Up/Dn";
- Freeze command is available, so "Code A" keyboard OK;
- Two-yellow button "Mute" command is supported;
- OPT7 handshake mode and power on panel connection blink codes available.
- **The "Source Lock" option in the "Options" menu MUST be turned ON (to stop the projector searching for other channels when an input is dropped.)**

RS232 connections to 3-Pin DIN Optoma Group 1

Mini-DIN 3 socket on projector. Coms at: 9600 DP8N1

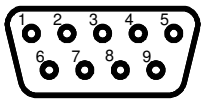
Function/Direction	T440 "projector" Connection	Optoma 3-pin Serial Port Connector	
Ground	Ground	Mini-DIN 3 pin 3 (Gnd)	
Data from T440 to projector	Tx	Mini-DIN 3 pin 2 (RXD)	
Reply data from projector to T440	Rx	Mini-DIN 3 pin 1 (TXD)	

Mini-DIN 3 solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

RS232 connections to Optoma Group 2: EP776, EP782 projector with D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, 1 stop.

Function/Direction	**T440 "projector" Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)	
Plus 9 volt CTS/DTR to projector	n/c	n/c	

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Panasonic projectors (Codes $30 to $32, $34)

Good set of current model RS232 codes:
https://eww.pavc.panasonic.co.jp/projector/extranet/main/sitemap/index.html

Code $30: (Group 1): No adr, OSH mute/PON unmute, abs audio, PT-L501/701, L502/702, L511/711/712, PT-L735, PT-F200, PT-LB50/51/55/60, PT-LC55/56/75/76/80, PT-P1SDE and a lot more;

Code $31: (Group 2): No adr, OSH:1 mute/OSH:0 unmute, abs audio, PT-F100/F100NT/FW100NT, PT-F200/F200NT, PT-LB75/LB75NT, PT-LB80/LB80NT; and

Code $32: (Group 3): No adr, OSH mute/PON unmute, NO audio, PT-AE900/AX100/AX200, PT-AE2000

Note: Panasonic have used toggle mode in the past for the "shutter" or mute function, which makes it hard to know the current mute state for the two-yellow-button-mute-mode, and the MUTE key in the freeze/mute keyboard (code A). We have determined that the use of the OSH command to turn ON the mute mode and the use of the PON (Power On) to exit mute mode works OK on these (Groups 1 and 3 above). Panasonic have recently made it easier by introducing absolute shutter control by adding OSH:1 (Shutter ON) and OSH:0 (Shutter OFF) commands which give proper control. These recent ones are the Group 2 in this family.

Channel codes are:

```
Computer1   := 02 + 'IIS:RG1' + 03;     // RGB 1 VGA analog-RGB
Computer2   := 02 + 'IIS:RG2' + 03;     // RGB 2 VGA analog-RGB
Computer3   := 02 + 'IIS:HDM' + 03;     // HDMI
Computer4   := 02 + 'IIS:HD1' + 03;     // HDMI 1
Computer5   := 02 + 'IIS:NWP' + 03;     // NETWORK

Video1      := 02 + 'IIS:VID' + 03;     // Vid composite
Video2      := 02 + 'IIS:SVD' + 03;     // S-Video
Video3      := 02 + 'IIS:YUV' + 03;     // COMPONENT
Video4      := 02 + 'IIS:HDM' + 03;     // HDMI
Video5      := 02 + 'IIS:HD1' + 03;     // HDMI 1
Video6      := 02 + 'IIS:HD2' + 03;     // HDMI 2
Video7      := 02 + 'IIS:NWP' + 03;     // NETWORK
```

Code $34: (Group 4): Address mode, OSH:1 mute/OSH:0 un-mute, abs audio, (Address models: PT-D3500, PT-D4000, PT-DW5000, PT-DW5100, PT-D5500, PT-D5600, PT-D5700, PT-DW7000, PT-D7700, PT-D10000, PT-DW10000, PT-D12000, PT-DZ12000, PT-L785 (not PT-L6500/6600)

Channel codes are:

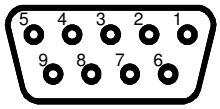
```
Computer1   := 02 + 'ADZZ;IIS:RG2' + 03;      // DB15-VGA analog-RGB
Computer2   := 02 + 'ADZZ;IIS:RG1' + 03;  // BNC (or DB15-VGA analog-RGB PT-L785)
Computer3   := 02 + 'ADZZ;IIS:RG3' + 03;      // BNC analog-RGB (PT-L785) on some
Computer4   := 02 + 'ADZZ;IIS:DVI' + 03;      // DVI-D
Computer5   := 02 + 'ADZZ;IIS:AUX' + 03;  // AUXILARY

Video1      := 02 + 'ADZZ;IIS:VID' + 03;      // Vid composite
Video2      := 02 + 'ADZZ;IIS:SVD' + 03;      // S-Video
Video3      := 02 + 'ADZZ;IIS:DVI' + 03;      // DVI-D
Video4      := 02 + 'ADZZ;IIS:AUX' + 03;  // AUXILARY
Video5      := 02 + 'ADZZ;IIS:RG1' + 03;  // RGB 1 BNC/DB15 (can be YCbCr component)
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

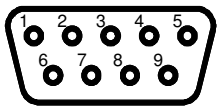
- Power on panel connection blink codes are provided, but OPT7 handshake mode is NOT;
- Auto Pixel Align is NOT available;
- Picture and sound mute is available with two-yellow-button mute mode with a "volume" keyboard;
- Mute and freeze keyboard code A available;
- Make sure to turn off "Auto input search" if your projector includes this;
- Make sure to set the baud rate to 9600 and no parity if an adjustment menu is provided.

RS232 connections to Panasonic projectors: Three systems in use:

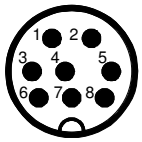
D-SUB 9 Female on projector, male on cable. Comms at 9600 8N1

Function/Direction	T440 "projector" Connection	Panasonic Serial Port Connector	
Ground	Ground	9-pin D-sub pin 5	 D-sub 9 male solder side
Data from T440 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T440	Rx	9-pin D-sub pin 2 (TXD)	
Plus 9 volt CTS/DTR to projector	N/C	N/C	

D-SUB 9 Male on projector, female on cable. Comms at 9600 8N1

Function/Direction	T440 "projector" Connection	Panasonic Serial Port Connector	
Ground	Ground	9-pin D-sub pin 5	 D-sub 9 female solder side
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)	
Plus 9 volt CTS/DTR to projector	N/C	N/C	

Mini-DIN-8 socket on projector. Comms at 9600 8N1

Function/Direction	T440 "projector" Connection	Panasonic Serial Port Connector	
Ground	Ground	mini-DIN 8 pin 4	 Mini-DIN 8 solder side
Data from T440 to projector	Tx	mini-DIN 8 pin 3 (RXD)	
Reply data from projector to T440	Rx	mini-DIN 8 pin 5 (TXD)	
Plus 9 volt CTS/DTR to projector	N/C	N/C	

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

CTS is NOT needed in units tested, so only connect TX, RX and GND.

Plus projector families: (Code 40 hex) Plus U5, U7 (not U6xxx or Taxan)

See master Plus code list at: http://www.plus-america.com/pdf/PC_Control_RS232.pdf

Channel codes are:

```
Computer1   := '#SR' + 0D + 0A;    // RGB 1 VGA analog-RGB
Computer2   := '#SA' + 0D + 0A;    // RGB 2 VGA analog-RGB2 on U7 only, DVI on some
Computer3   := '#SN' + 0D + 0A;    // Network on U7 only

Video1      := '#SV' + 0D + 0A;    // Comp Video
Video2      := '#SS' + 0D + 0A;    // S-Video
Video3      := '#SN' + 0D + 0A;    // Network on U7 only
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- OPT7 handshake mode and power on panel connection blink codes available;
- Turn off the auto-source feature.

RS232 connections to (all) Plus projectors

U2 and U4 use a short cable with a 9-pin-D9 female one end and a 4-pin USB-style on the other. This cable is supplied by PLUS, and the hole to plug it in is very small, on the rear terminal panel covered with a stick-on silver plastic film.

U5 has a standard D9 male connector on the rear. U7 has 9-pin mini-DIN. Connections are the same for all four ranges.

Function/Direction	**T440 "projector" Connection**	**Plus "Control" Port Connector 9-pin D-sub**	**Plus "Control" Port Connector mini-DIN 9 pin**
Ground	Ground	9-pin D-sub pin 5	9pin mini-DIN Pin 4
Data from T440 to projector	Tx	9-pin D-sub pin 3 (RXD)	9-pin mini-DIN, Pin 1 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 2 (TXD)	9-pin mini-DIN, Pin 7 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C	N/C

Mini-DIN 9 solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Baud rate change

This family of projectors can be operated at 115,200 baud or 19,200 baud. As shipped from Plus, communications is at 115,200 baud, and **must be set using a PC to 19,200 for use with a T440.** Switch to 19,200 as follows:

Connect to a PC via a straight-though serial cable and run HyperTerminal, setting it up to run at 115,200 baud, 8 bit data, 1 start, 1 stop, no parity, no hardware handshake (8N1). (Unless you have enabled "local echo", you will not see the characters as you type them. You can enable echo by going to **File->Properties->Settings->ASCII** Setup and ticking **Echo typed characters locally**.) HyperTerminal is found under Accessories in the Windows system.

Verify communications by typing **#QS(CR)(LF)** (The "**QS**" must be upper case. The CR and LF must follow. Send a CR with the **ENTER** key, and send the LF by holding down **CTRL** and pressing **ENTER.**) The projector should reply with its status, eg **#QS2** if OFF, and **#QS6** if warmed up and running. If, **OFF**, the projector can be turned **ON** with the **#P1(CR)(LF)** command. (The character after the **P** is a numeric **1**.)

Now set it to 19,200 baud by sending a command **#CL(CR)(LF)** from a PC running HyperTerminal at 115,200 baud. (It will switch immediately, so the reply will be gibberish.)

Now terminate the HyperTerminal session at 115,200 baud and restart it at 19200 baud, (8N1, no handshake, local echo enabled). Type **#QS(CR)(LF)** and verify status reply at 19,200 baud. A **#P0(CR)(LF)** command powers down the U5. (The character after the **P** is a numeric **0**.) (The U5 can be reset to 115,200 baud with a **#CH(CR)(LF)** command.)

The baud rate is held in projector non-volatile memory, so the baud rate setting to 19,200 need be done only once. (These commands are in Release N of the PLUS manual. Make sure the projector software is up-to-date).

Sanyo LCD display/TV (Code 0A hex)

Sanyo LCD flat panel LCD42/47XR7

Channel codes are:

```
Computer1    := 02 + 'INP:6' + 03;    // Select VGA
Computer2    := 02 + 'INP:7' + 03;    // Select HDMI-1
Computer3    := 02 + 'INP:8' + 03;    // Select HDMI-2

Video1       := 02 + 'INP:1' + 03;    // Comp Video/S=Vid  (on same channel, S-Vid has priority)
Video2       := 02 + 'INP:3' + 03;    // SCART 1 video via adaptor
Video3       := 02 + 'INP:4' + 03;    // SCART 2 video via adaptor
Video4       := 02 + 'INP:5' + 03;    // SCART 2 s-video via adaptor
Video5       := 02 + 'INP:2' + 03;    // Video YPbPr
Video6       := 02 + 'INP:7' + 03;    // Select HDMI-1
Video7       := 02 + 'INP:8' + 03;    // Select HDMI-2
Video8       := 02 + 'INP:0' + 03;    // Select TV
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels.)

The TV setting uses the following command:

```
TV           := 02 + 'INP:0' + 03;    // Select TV
```

This panel can be used with a number of keyboards:

- With a "Code 9" or "Code A" keyboard, with buttons selecting "Video" and 'Computer", with either "Volume" (code 9) or "Freeze/Mute" (Code A);
- With a "Code B-L" or "Code B-P" keyboard, with buttons selecting "Video" and "Computer1" and "Computer2" with Volume control keys; or
- With a "Code E" keyboard, with buttons selecting "TV", "Video" and "Computer", with TV channel Up/Down and Volume control keys. The channel commands send absolute channel commands, so the upper and lower limits must be programmed into Constant:A and Constant:B. (Default is 0 -> 10.)

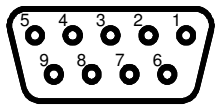
(Keyboards B and E combine channel keys with "On" keys.)

- OPT7 handshake mode and power on panel connection blink codes available.

RS232 connections to Sanyo LCD

These use a 9-pin-D9 male on the projector, male on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T440 "projector" Connection**	**Sanyo "Control" Port Connector**
Ground	Ground	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 3 (RXD)
Reply data from projector to T440	Rx	9-pin D-sub pin 2 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C



D-sub 9 male solder side

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Sanyo, Eiki projectors (Code 02 hex, absolute audio, Code 03 hex, inc. audio, Code 04 hex, C07 video, Code 05 hex, C05 Computer 1)

This family has many members with a range of channel messages.
Sanyo has RS232 code charts on www.sanyo.com.au listing codes for each projector.

Many **Eiki**, e.g. LC-SB, SD, SE, SX, W, WB, X (most, but not 3-digit ones), XA, XB, XE, XG, XGA, XT.
Not LC-EIP (see Sharp) or XIP2000 or XWP2000 (yet).
Check codes at: http://www.eiki.com/Support/Default.aspx (some older use just C05, C06, C07 codes below).

If absolute audio (Code 02) doesn't work, use Code 03, which sends incremental audio.

Channel codes are:

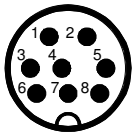
```
Computer1   := 'C50' + 0D;   // Input 1 Analog RGB DB15
Computer2   := 'C25' + 0D;   // Input 2 Analog RGB DB15
Computer3   := 'C52' + 0D;   // Input 1 DVI (PC Digital)
Computer4   := 'C05' + 0D;   // Input 1 / Slot 1
Computer5   := 'C06' + 0D;   // Input 2 / Slot 2
Computer6   := 'C81' + 0D;   // Input 4 / Wired network
Computer7   := 'C82' + 0D;   // Input 4 / Wireless

Video1      := 'C33' + 0D;   // Input 3 Composite Video RCA
Video2      := 'C34' + 0D;   // Input 3 S-Video
Video3      := 'C35' + 0D;   // Input 3 Y, Pb/Cb, Cb/Cr (Component)
Video4      := 'C07' + 0D;   // Input 3 / Slot 3
Video5      := 'C23' + 0D;   // Input 2 Composite Video RCA
Video6      := 'C24' + 0D;   // Input 2 S-Video/Component RCA
Video7      := 'C25' + 0D;   // Input 2 Component 1 RCA
Video8      := 'C26' + 0D;   // Input 2 Component 2
Video9      := 'C06' + 0D;   // Input 2 / Slot 2
Video10     := 'C53' + 0D;   // Input 1 DVI (AV HDCP)
Video11     := 'C54' + 0D;   // Input 1 Component
Video12     := 'C05' + 0D;   // Input 1 / Slot 1
Video13     := 'C81' + 0D;   // Input 4 Composite Video / Wired network
Video14     := 'C82' + 0D;   // Input 4 S-Video / Wireless
Video15     := 'C83' + 0D;   // Input 4 Component / USB viewer
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default).

- Some models (eg **PLC-XW55/56**) use command C07 for composite video, so use Code 04 hex for these.
- Some models (eg **PLC-XU105**) use command C05 for Computer:1, so use Code 05 hex for these.
- Setting OPT2 switch ON will send an Auto Pixel Align message 30 seconds after selecting a computer channel;
- Pressing a "Computer" channel key when already selected will instead send a Auto Pixel Align whenever needed;
- OPT7 handshake mode and power on panel connection blink codes available.

RS232 connections to Sanyo projectors

8-Pin DIN circular connector group: Communications is at 19200 baud, 8N1.

Function/Direction	T440 "projector" Connection	Control Port Connector	
Ground	Ground	8-pin DIN pin 4	 Mini-DIN 8 solder side
Data from T440 to projector	Tx	8-pin DIN pin 1 (RXD)	
Reply data from projector to T440	Rx	8-pin DIN pin 6 (TXD)	
Plus 9 volt CTS/DTR to projector	CTS	8-pin DIN pin 5 (CTS/RTS)	

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Sanyo projector PLC-WXU10N (Code 07 hex)

This family has one member with just 5 channel messages.

There is an RS232 code chart at:
http://www.slideandsound.com/pdf/sanyo/projectors/Owners_Manuals/om_PLC-WXU10N.pdf

Channel codes are:

```
Computer1   :=  BE + EF + 02 + 06 + 00 + 0B + D2 + 32 + 00 + 00 + 00 + 00 + 00;   // RGB 1 VGA
Computer2   :=  BE + EF + 02 + 06 + 00 + 8F + D3 + 36 + 00 + 00 + 00 + 00 + 00;   // DVI-D

Video1      :=  BE + EF + 02 + 06 + 00 + BC + D3 + 35 + 00 + 00 + 00 + 00 + 00;   // Comp Video
Video2      :=  BE + EF + 02 + 06 + 00 + 6D + D2 + 34 + 00 + 00 + 00 + 00 + 00;   // S-Video
Video3      :=  BE + EF + 02 + 06 + 00 + DA + D3 + 33 + 00 + 00 + 00 + 00 + 00;   // Component
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default).

- The "Input search" function MUST be disabled in the projector;
- Audio is limited: there is only one stereo RCA input, and NO audio output. There is control (incremental, 0->100 NOT 0->60 as the manual says) via the RS232 control if a "Volume" keyboard is used, but only to the rather weak internal speaker. Use a T461 if better audio and switching is needed;
- Freeze and mute toggle only with the "Freeze/Mute" keyboard. No LEDs flash in the "Mute" state. No 2-yellow-button mute is provided with a "Volume" keyboard as the limited projector codes cannot command absolutely or read back the mute state;
- Users can set OPT2 ON to enable sending Automatic Pixel Align 30 seconds after each Computer source transmission;
- No "Projector Comms OK" message is available from the projector in Standby;
- No OPT7 handshake mode or power on panel connection blink codes are available (no status readback is provided).

RS232 connections to Sanyo PLC-WXU10N

To connect the T440 to these projectors use a mini-DIN 6 male on the cable: Comms is at 19200 baud 8N1.

Function/Direction	**T440 "projector" Connection**	**Projector Connector Connector 6-pin mini-DIN**
Ground	Ground	Mini-DIN Pins 1, 2
Data from T440 to projector	Tx	Mini-DIN Pin 3 (RXD)
Reply data from projector to T440	Rx	Mini-DIN Pin 5 (TXD)
Plus 9 volt CTS/DTR to projector	N/C	N/C

Mini-DIN 6
solder side

Note: The signal input and output of this projector has clamp diodes and never goes below –0.7 volts or over +5.7 volts, even when connected to the T440.

Sharp, EIKI EIP projectors (Code 20 hex, absolute audio)

This family has many members with a range of channel messages.

Sharp has RS232 code charts at the back of the Operation Manual for each projector.

Channel codes are:

```
Computer1 := 'IRGB   1' + 0D;      // RGB 1 VGA analog-RGB
Computer2 := 'IRGB   2' + 0D;      // RGB 2 analog, sometimes DVI analog
Computer3 := 'IRGB   3' + 0D;      // DVI Analog
Computer4 := 'IRGB   4' + 0D;      // DVI Digital

Video1 := 'IVED   1' + 0D;         // Comp Video/S-Video   / Component 1
Video2 := 'IVED   2' + 0D;         // S-Video / Comp Video / Component 2
Video3 := 'IVED   3' + 0D;         // Comp Video 2
Video4 := 'IVED   4' + 0D;         // S-Video 2
Video5 := 'IVED   5' + 0D;         // RGB/COMPONENT on SHARP DT-400, XV-Z2000, EIKI EIP-1500
Video6 := 'IVED   6' + 0D;         // DIGITAL MODE on SHARP DT-400, XV-Z2000, EIKI EIP-1500
Video7 := 'ISEV   1' + 0D;         // S-VIDEO on EIKI_EIP_S200/X200/X350
Video8 := 'ICMP   1' + 0D;         // COMPONENT on EIKI_EIP_S200/X200/X350
Video9 := 'IDVI   1' + 0D;         // DVI on EIKI_EIP_S200/X200/X350
```

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels.)

- Some models use IVED 1 for Comp Video, and IVED2 for S-Video, and some use the reverse;
- OPT7 handshake mode and power on panel connection blink codes available.

RS232 connections to Sharp/Eiki projectors

These use a D-sub 9-pin connector, female or male on cable: (May be via an adaptor cable from projector 9-pin mini-DIN) Communications is at 9600 baud 8N1. Some projectors may need this to be set up via an on-screen menu.

Function/Direction	**T440 "projector" Connection**	**Sharp Control Port Connector, D-sub 9**	**Sharp Control Port Connector DIN 9**
Ground	Ground	9-pin D-sub pin 5	9-pin D-sub pin 5
Data from T440 to projector	Tx	9-pin D-sub pin 2	9-pin D-sub pin 2
Reply data from projector to T440	Rx	9-pin D-sub pin 3	9-pin D-sub pin 3
Plus 9 volt CTS/DTR to projector	CTS	unused	unused

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Sony (Code 08 hex, Even Parity, Code 09 hex No Parity)

Even parity: SONY VPL-CX61/CX63/CX80/CX85/CX86/CX100/CX120/CX125/CX150/CX155, VPL-ES4/EX4 SONY_FE40/FX40/FX50/FX51/FX52/PX11/PX15/PX35/PX40/PX41: Code 08 hex

No parity: VPL-ES3/EX3: Code 09 hex

A protocol manual is at:

http://www.kavena.se/fileadmin/uploads/downloads/Sony/Projektorer/VPL-FX40/ProtocolRS232FX40.pdf

This family has common codes, but allocate the "Inputs A/B/C/D" differently.

Channel codes are:

```
Computer1  :=  A9 + 00 + 01 + 00 + 00 + 02 + 03 + 9A;     // Input A VGA analog-RGB
Computer2  :=  A9 + 00 + 01 + 00 + 00 + 03 + 03 + 9A;     // Input B   or Component
Computer3  :=  A9 + 00 + 01 + 00 + 00 + 04 + 05 + 9A;     // Input C   or HDMI
Computer4  :=  A9 + 00 + 01 + 00 + 00 + 05 + 05 + 9A;     // Input D   or DVI

Video1     := A9 + 00 + 01 + 00 + 00 + 00 + 01 + 9A;      // Composite Video RCA
Video2     := A9 + 00 + 01 + 00 + 00 + 01 + 01 + 9A;      // S-Video
Video3     := A9 + 00 + 01 + 00 + 00 + 02 + 03 + 9A;      // Input A (could be component)
Video4     := A9 + 00 + 01 + 00 + 00 + 03 + 03 + 9A;      // Input B  could be component)
Video5     := A9 + 00 + 01 + 00 + 00 + 04 + 05 + 9A;      // Input C  or HDMI
Video6     := A9 + 00 + 01 + 00 + 00 + 05 + 05 + 9A;      // Input D  or DVI
```

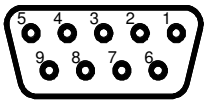
Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- OPT7 handshake mode and power on panel connection blink codes available;
- Pressing a "Computer" channel key when already selected will instead send a Auto Pixel Align whenever needed;
- Setting OPT2 switch ON will send an Auto Pixel Align message 30 seconds after selecting a computer channel;
- Picture and sound mute is available with two-yellow-button mute mode, but no Freeze is available.

RS232 connections to Sony projectors and LCD flat panel

These all use a D-sub 9-pin connector, male on cable.

VPL- CX85/86, FX50/51/52, PX11/15/35/40/41 38400 BAUD, Even parity, 1 stop.
VPL- ES3/EX3, 38400 BAUD, No parity, 1 stop.

Function/Direction	**T440 "projector" Connection**	**Projector Connector (Male on cable)**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T440 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T440	Rx	9-pin D-sub pin 3 (TXD)	
Plus 9 volt CTS/DTR to projector	N/C	N/C	

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Toshiba (Codes $50 to $54 hex)

A good collection of protocol manuals is at:
http://www.isd.toshiba.com.au/projectors/projectors/service-manuals.shtml

Code $50: (Group 1.1): TLP-S200/S201/S220/S221, TLP-T400/T401, TLP-T500/T501/T520/T521, TLP-T600/T601/T620/T621, and TLP-T700/T701/T720/T721;

Code $51 (Group 1.2): TDP-MT200/MT400;

Code $51 (Group 1.3): TDP-S20/S21/SC21/S25/SC25/SW25/S35/SC35/SW35, TDP-S80/SW80/S81/T90/TW90/T91/T99/TW99, and TLP-710/711;

Code $51 (Group 1.4): TDP-S8/S10, SW20, TDP-T8/T9/T30/T40/T45/T80/T98, TLP-250/251/260/261/380/381/550/551/560/561/780/781/790/791, TLP-MT7E, TLP-X10U/11U/20U/21U;

Code $51 (Group 1.5): TDP-D1/D2, TLP-S30/S40/S41/S70/S71, and TLP-T50/T60/T61/T70/T71;

Code $52 (Group 1.6): TLP-450/451/470/471/650/651/670/671/680/681/, TLP-B2/U (RGB set only Ch 1).

	Group 1.1	Group 1.2	Group 1.3	Group 1.4	Group 1.5	Group 1.6
Computer 1	STX IN1 ETX (RGB1)	STX IN1 ETX (RGB1)	STX IN1 ETX (RGB1)	STX IN1 ETX (RGB1)	STX IN1 ETX (RGB1)	STX IN1 ETX (RGB)
Computer 2	STX IN3 ETX (RGB2)	STX IN2 ETX (DVI)	STX IN2 ETX (RGB2)	STX IN2 ETX (RGB2)		
Computer 3			STX IN6 ETX (Network)			
Video 1	STX IN5 ETX (Video)	STX IN3 ETX (Video)	STX IN3 ETX (Video)	STX IN3 ETX (Video)	STX IN3 ETX (Video)	STX IN3 ETX (Video)
Video 2	STX IN6 ETX (S-Video)	STX IN4 ETX (S-Video)	STX IN4 ETX (S-Video)	STX IN4 ETX (S-Video)	STX IN4 ETX (S-Video)	STX IN4 ETX (S-Video)
Video 3	STX IN2 ETX (YPbPr1)				STX IN2 ETX (YPbPr)	
Video 4	STX IN4 ETX (YPbPr2)	STX IN5 ETX (YPbPr)	STX IN5 ETX (Camera)	STX IN5 ETX (PC card)	STX IN5 ETX (Camera)	
Video 5	STX IN7 ETX (PC card)		STX IN6 ETX (Network)	STX IN6 ETX (Camera)		
Video 6	STX IN8 ETX (Camera)					

(Group 2 next page.)

Code $54 (Group 2.1): TDP-T/TW95, T/TW100, TDP-T250/TW250, TDP-T300/TW300, TDP-T350/TW350, TDP-T355/TW355

Code $54 (Group 2.2): TLP-X2000/XC2000/XD2000, TLP-X2500/XC2500, TLP-X3000/XC3000, TLP-WX2200,

Code $54 (Group 2.3): TDP-ST20, TDP-EX20, TDP-EW25

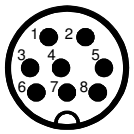
	Group 2.1	**Group 2.2**	**Group 2.3**
Computer 1	STX IN3 ETX (RGB 1 or DVI-A)	STX IN1 ETX (RGB1)	STX IN1 ETX (RGB1)
Computer 2	STX IN5 ETX (RGB2)	STX IN2 ETX (RGB2)	STX IN2 ETX (RGB2)
Computer 3			STX IN6 ETX (Network)
Video 1	STX IN5 ETX (Video)	STX IN3 ETX (Video)	STX IN3 ETX (Video)
Video 2	STX IN6 ETX (S-Video)	STX IN4 ETX (S-Video)	STX IN4 ETX (S-Video)
Video 3	STX IN2 ETX (YPbPr1)	STX IN2 ETX (YPbPr1)	STX IN2 ETX (YPbPr1)
Video 4	STX IN4 ETX (YPbPr2)	STX IN4 ETX (YPbPr2)	STX IN4 ETX (YPbPr2)
Video 5	STX IN8 ETX (BNC3/YPbPr3)		
Video 6		STX INB ETX (Camera)	
Video 7			STX INC ETX (Network)
Video 6	STX IND ETX (USB/Wireless)		STX IND ETX (USB/Wireless)

Any one of these codes can be set into Constant:0/Constant:1 for computer codes and Constant:2/Constant:3 for video codes. (The default is to have Computer1 (above) as the "Computer" channel and Video1 as the "Video" channel. Setting OPT1 switch ON will swap Video1 and Video2 channels, making S-Video the video default.)

- Power on panel connection blink codes are provided, but OPT7 handshake mode is NOT;
- Auto Pixel Align is NOT available;
- Picture and sound mute is available with two-yellow-button mute mode with a "volume" keyboard;
- Mute and freeze keyboard code A available;
- Make sure to turn off "Auto input search" in the "Default setting" menu page of the projector.

RS232 connections to NEC projectors

Most use a male 8-pin mini-DIN.

Function/Direction	**T440 "projector" Connection**	**"Serial" Port Connector**	 Mini-DIN 8 solder side
Ground	Ground	8-pin mini-DIN pin 4	
Data from T440 to projector	Tx	8-pin mini-DIN pin 1 RXD)	
Reply data from projector to T440	Rx	8-pin mini-DIN pin 7 TXD)	
Plus 9 volt CTS/DTR to projector	N/C	N/C	

After installation wiring of any projector to a T440, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

Taxan projector families: (Code 42 hex)

Taxan PS101S/121X, PD121X (made by Kaga)

Channel codes are:

```
Computer1       := '04FB' + 0D    // Computer
Video1          := '03FC' + 0D;   // Video
```

(This projector has an S-Video input but a code to select it does not seem to have been included in the code list.)

- OPT7 handshake mode and power on panel connection blink codes NOT available.

RS232 connections to (all) Plus projectors

Taxan projectors have a DB9 RS232 connector. We have not been able to determine whether it is a male or female on the cable or what the signal connections are. To determine what line is what, measure the voltage on pins 2 and 3. If a pin has -5 to -9 volts on it is an output from the projector and should be connected to the RX output on the T440. The other line into the projector should have a resistance to ground of about 5kohm. This is the data input and connects to the T440 TX output.

Note: There is confusion as to whether these models even have RS232 coms! Some manuals don't even mention it!

Baud rate change

This family of projectors can be operated at 115,200 baud or 19,200 baud. As shipped from Kaga, communications is at 115,200 baud, and **must be set using a PC to 19,200 for use with a T440.** Switch to 19,200 as follows:

Connect to a PC via a straight-though serial cable and run HyperTerminal, setting it up to run at 115,200 baud, 8 bit data, 1 start, 1 stop, no parity, no hardware handshake (8N1). (Unless you have enabled "local echo", you will not see the characters as you type them. You can enable echo by going to **File->Properties->Settings->ASCII** Setup and ticking **Echo typed characters locally**.) HyperTerminal is found under Accessories or Programs in the Windows system or can be downloaded from: http://www.hilgraeve.com/htpe/

Verify communications by typing **#QU(CR)(LF)** (The "**QU**" must be upper case. The CR and LF must follow. Send a CR with the **ENTER** key, and send the LF by holding down **CTRL** and pressing **ENTER.**) The projector should reply with its lamp hours in hex, eg **#QUhhhh**.

Now set it to 19,200 baud by sending a command **#CL(CR)(LF)** from a PC running HyperTerminal at 115,200 baud. (It will switch immediately, so the reply will be gibberish.)

Now terminate the HyperTerminal session at 115,200 baud and restart it at 19200 baud, (8N1, no handshake, local echo enabled). Type **#QU(CR)(LF)** and verify hours reply (**QUhhhh)** at 19,200 baud.

The baud rate is held in projector non-volatile memory, so the baud rate setting to 19,200 need be done only once. (These commands are in Release N of the manual).